Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently Amended) A method of identifying presence or absence of a defect in a semiconductor wafer, the method comprising:

applying heat to a conductive structure formed on said semiconductor wafer, said conductive structure being periodic in space along a direction;

measuring a signal indicative of temperature of a portion of the conductive structure heated by conduction of the applied heat therethrough, thereby to obtain a measurement;

repeating the act of measuring at each of a number of different locations on the conductive structure, thereby to obtain a plurality of measurements, wherein said locations are along said direction; and

determining absence of the defect in the conductive structure, on finding periodicity in the plurality of measurements, wherein said periodicity is related to periodicity of the conductive structure.

2. (Original) The method of Claim 1, wherein:

a laser beam is used during said applying of heat;

reflection of another laser beam is measured during said measuring; and

the laser beams are scanned together during said measuring.

3. (Original) The method of Claim 2, wherein:

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the laser beams are coincident, thereby to form a single spot on the conductive structure.

4. (Original) The method of Claim 1, wherein:
the conductive structure has at least one dimension less than 1 μm.

5. (Original) The method of Claim 1, wherein:
an electron beam is used during said applying of heat.

6. (Original) The method of Claim 1, wherein:
a thermal imager is used during said measuring.

Claim 7 (canceled).

8. (Previously Amended) The method of Claim 1, wherein:
said determining includes using a transform of said plurality of measurements, said transform converting said plurality of measurements from a spatial domain into a frequency domain.

9. (Previously Amended) The method of Claim 1, wherein:
said determining includes identifying a frequency component not found in a corresponding plurality of measurements from a reference wafer.

10. (Previously Amended) The method of Claim 1, wherein:
said determining includes comparing a curve defined by said plurality of measurements to a reference curve defined by a corresponding plurality of measurements from a reference wafer.

11. (Previously Amended) The method of Claim 1, wherein:

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said determining includes comparing a curve defined by said plurality of measurements to a baseline.

12. (Previously Amended) The method of Claim 1, wherein:

a measurement is performed at least at a plurality of vias located sequentially one after another in said direction.

13. (Previously Amended) The method of Claim 1, wherein:

a pump beam is incident on a first trace in the conductive structure during said applying; and

a probe beam is incident on a second trace in said conductive structure during said measuring; and

wherein said first trace is coupled to said second trace through at least one via.

14. (Previously Amended) The method of Claim 13, wherein:

each of said first trace and said second trace are in a single metal layer.

15. (Previously Amended) The method of Claim 13, wherein:

each of said first trace and said second trace are in different metal layers.

16. (Original) The method of Claim 1, wherein:

said determining includes comparing the plurality of measurements to a corresponding plurality of measurements obtained from a reference wafer.

17. (Original) The method of Claim 1, wherein:

said repeated acts of measuring are performed while moving a stage carrying the semiconductor wafer containing the conductive structure; and

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performing said measuring continuously, thereby to obtain an analog signal; and

using said analog signal during said determining.

18. (Previously Amended) A method for determining the quality of a first conductive structure, the method comprising:

applying heat to the first conductive structure using a modulated heat source, said first conductive structure being periodic in space along a direction;

measuring a first phase difference between temperature change of said first conductive structure and modulation of said heat source; and

analyzing whether said phase difference is larger than a second phase difference, said second phase difference being detected with a second conductive structure that is non-defective, to determine quality of said first conductive structure.

19. (Original) The method of Claim 18 wherein reflection of a laser beam is used to measure the phase difference.

20. (Previously Amended) The method of claim 18 wherein said quality is related to a defect in said first conductive structure.

21. (Original) The method of Claim 20 wherein said defect is any defect in a group consisting of voiding, narrow trace, and misalignment of a via to a trace.

22. (Previously Amended) A method for determining the quality of a conductive structure, the method comprising:

applying heat to the conductive structure using a modulated heat source, wherein said conductive structure comprises a plurality of via chains, and the heat is applied simultaneously to more than one via chain;

varying the frequency of modulation of said heat source;

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measuring a change in temperature of said conductive structure, as a function of the frequency of modulation; and

analyzing said function to determine the quality of said conductive structure.

23. (Original) The method of Claim 22, wherein reflection of a laser beam is used to measure the temperature change.

24. (Original) The method of Claim 22, wherein heat is applied to said conductive structure using a laser beam.

25. (Original) The method of Claim 22 further comprising:

repeating the act of measuring at each of a number of different locations on the conductive structure, thereby to obtain a plurality of measurements; and

using said plurality of measurements during said analyzing.

26. (Original) The method of Claim 22 further comprising:

moving a stage carrying a semiconductor wafer containing the conductive structure at a fixed speed; and

performing said act of measuring continuously, thereby to obtain an analog signal; and

using said analog signal during said analyzing.

27. (Original) The method of Claim 22 wherein said analyzing comprises:

identifying irregular features in the conductive structure.

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28. (Previously Amended) An apparatus for identifying a defect in a conductive structure, the apparatus comprising:

a laser for applying heat to the conductive structure, the conductive structure being periodic in space along a direction ;

a sensor for measuring a signal indicative of temperature of a portion of the conductive structure heated by conduction of the applied heat therethrough, at a number of different locations on the conductive structure, thereby to obtain a plurality of measurements, wherein said locations are along said direction; and

means for determining presence of the defect in the conductive structure, based on finding aperiodicity in the plurality of measurements.

29. (Previously Amended) The apparatus of Claim 28, wherein said sensor for measuring comprises a thermal imager.

30. (Previously Amended) The apparatus of Claim 28 wherein said means for determining comprises a personal computer.

31. (Original) The method of Claim 1 wherein:

a spatial frequency of the plurality of measurements is equal to inverse of the periodicity of the conductive structure.

32. (Original) A method of identifying a defect in a semiconductor wafer, the method comprising:

using a first beam to apply heat to a conductive structure formed on said semiconductor wafer, the conductive structure being periodic in space;

using a second beam to measure a signal indicative of temperature of a portion of the conductive structure heated by conduction of the applied heat therethrough, thereby to obtain a measurement;

repeating the act of measuring at each of a number of different locations on the conductive structure, thereby to obtain a plurality of measurements; and

determining presence of the defect in the conductive structure, depending on spatial periodicity of the plurality of measurements;

wherein the first beam and the second beam are at least partially coincident.

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33. (Original) The method of Claim 32 wherein:

the first beam and the second beam are perfectly coincident, thereby to form a single spot on the conductive structure.

34. (Currently Amended) ~~The method of Claim 18~~

A method for determining the quality of a first conductive structure, the method comprising:

applying heat to the first conductive structure using a modulated heat source, said first conductive structure being periodic in space along a direction;

measuring a first phase difference between temperature change of said first conductive structure and modulation of said heat source; and

analyzing whether said phase difference is larger than a second phase difference, said second phase difference being detected with a second conductive structure that is non-defective, to determine quality of said first conductive structure;

wherein:

the heat source is modulated at a frequency selected to be sufficiently low to prevent generation of a thermal wave.

Please add the following new claims.

35. (New) The method of Claim 18 wherein a pump beam is used in said applying, and a probe beam is used in said measuring, and wherein:

the pump beam and the probe beam form spots on said first conductive structure that at least partially overlap each other.

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36. (New) The method of Claim 18 wherein a pump beam is used in said applying, and a probe beam is used in said measuring, the method further comprising:

scanning the pump beam in unison with the probe beam.

37. (New) The method of Claim 36 wherein:

the pump beam illuminates a first trace in a first metal layer of the first conductive structure; and

the probe beam illuminates a second trace in a second metal layer of the first conductive structure.

38. (New) The method of Claim 36 wherein:

the pump beam illuminates a first trace in a first metal layer of the first conductive structure; and

the probe beam illuminates said first trace in said first metal layer of the first conductive structure.

39. (New) The method of Claim 36 wherein:

the pump beam illuminates a first trace in a first metal layer of the first conductive structure; and

the probe beam illuminates a second trace in said first metal layer of the first conductive structure.

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